

Contribution to the knowledge of bryophyte flora from Mt Sinjavina (Montenegro)

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Abstract. During research of the southeast parts of Mt Sinjavina, we have registered 64 bryophyte species. Fifty-eight representatives of *Bryopsida* have been identified and six taxa of *Marchantiopsida*. *Hedwigia ciliata* was found for the first time in the bryoflora of Montenegro.

Key words: *Bryopsida*, *Marchantiopsida*, Montenegro

Introduction

Mt Sinjavina is located in the northwestern part of Montenegro. It belongs to the middle southeast Dinaric Alps, with NW-SE bearings. The highest peaks are Babji Zub or Torna (2277 m) and Gradište (2214 m). Below them come steep slopes with strong active and semi-active scree and funnels. This mountain massif has an average altitude of about 1700 m.

The bedrock of Mt Sinjavina consists of carbonate rocks covered by a fine layer of fertile soil (Fuštić & Đuretić 2000). The high crests of Babji Zub and Gradište form a natural divide between the Mediterranean and continental climate. The southern slopes are influenced by the Mediterranean, while the northern parts are characterized by a moderate continental climate, ranging to sub-alpine climate at higher elevations.

This rather restricted area has a rich flora comprising over 700 species of vascular plants (Vuksanović 2003). The southern slopes of peak Gradište are overgrown with oak forests dominated by *Quercus cer-*

ris L. These thermophilous forests have mostly degraded and usually overgrow rocky grounds. Above the zone of oak forests follow low-growth forests and underbrush of white hornbeam. Further up there are forests of the association *Pinetum heldreichii* Bleč. Black pine (*Pinus nigra* Arnold) is present on the southern slopes of peak Babji Zub, in the Prodo locality. Mixed oak and fir forests, *Abieti-Fagetum* (Vuksanović 2003), are located between 1100 m to 1500 m on the continental slopes of peaks Babji Zub and Gradište.

The aim of this paper was an investigation of the bryophyte flora on the southeastern slopes of Mt Sinjavina (Fig. 2).

Material and methods

The bryoflora was researched in October 2001 and March 2002. Material was collected at the villages Gornje Lipovo, Svrke and Redice, and in the localities Drage, Jelje, Popov Krš (these localities are on the northern side of Babji Zub), Prodo and Plašnica

stream. Drage is an opening in an *Abieti-Fagetum* forest; Jelje is an *Abieti-Fagetum* forest; Popov Krš is scree besides Jelje and Đedov Do (a saddle below Babji Zub); Prodo marks the south side of Babji Zub, scree below Đedov Do.

The nomenclature used is according to Hill & al. 2006 for mosses and Söderström & al. 2002 for hepatics. Floristic elements and distribution are determined by Duell 1983 and Duell & al. 1999.

The collected material is deposited in the bryological collection housed at the Museum of Natural History of Montenegro in Podgorica.

Results and discussion

During the present study of the bryoflora in eight localities of Mt Sinjavina there were established 64 taxa (58 mosses and 6 liverworts). The most diverse community was the oak–fir forest in the Drage locality containing 27 species. Lower diversity was recorded at Svrke village, where 23 species were found, while at the other sites the bryoflora was considerably poorer (Redice–14, Prodo–12, Jelje and Gornje Lipovo–11, Popov Krš six and stream Plašnica–4). In terms of orientation of the studied localities, 25 species were collected mostly from the northern slopes of Mt Sinjavina, 20 from the southern slopes and 19 species from both, southern and northern slopes.

Most species found during this study have already been reported for the bryophyte flora of Montenegro (Sabovljević & Stevanović 1999; Sabovljević 2000; Dragičević & al. 2001a, b; Milikić & al. 2001).

Hedwigia ciliata (Hedw.) P. Beauv. was registered for the first time on the territory of Montenegro. This species was collected in the Prodo locality, on the southern slopes of Mt Sinjavina. It prefers dry, sunny habitats, where it forms communities with *Ditrichum flexicaule*, *Encalypta streptocarpa*, *Homalothecium*

sericeum, *H. lutescens*, *Pseudocrossidium hornschuchianum*, *Abietinella abietinum* and *Syntrichia ruralis*.

The largest proportion of the bryoflora in the studied area is constituted of species of the temperate floristic element (31 species), followed by the subboreal (15) and boreal-mountain elements (8). The majority of taxa have a cholarctic area of distribution (39), while the number of cosmopolitan and subcosmopolitan species (15) and the Eurasian–African species (9) is considerably lower.

Due to the specific relief, climate and other natural characteristics of Mt Sinjavina and other mountains in Montenegro, higher diversity of bryophytes and new findings can be expected. This contention has been confirmed by the fact that on the nearby Mt Durmitor, which is better investigated, starting from Vilhelm (1923) and up to the present days, over 190 taxa were identified (Kurschner & Parolly 1997; Sabovljević & Stevanović 2000).

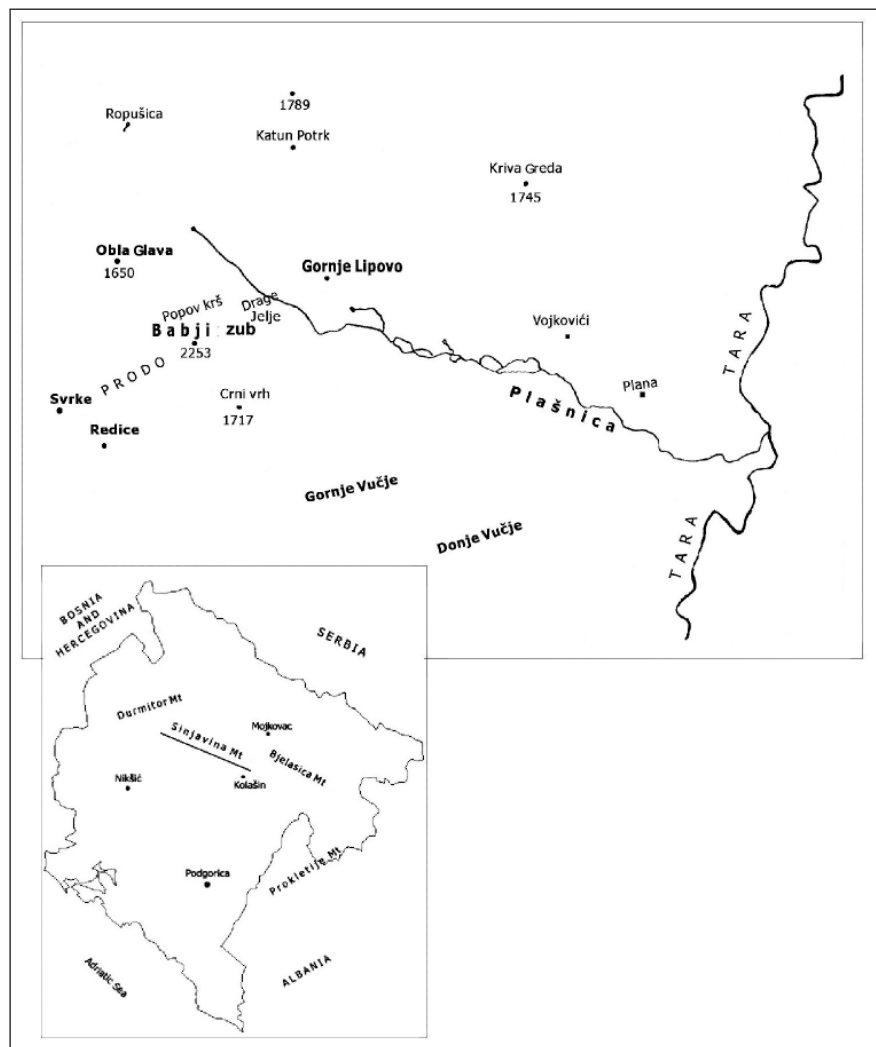


Fig. 2. Map of Montenegro with investigated localities.

List of mosses

- Abietinella abietina** (Hedw.) M. Fleisch.
Prodo: on soil, October 2001; Drage: *Abieti-Fagetum* forest, on soil and on rocks, October 2001; village Svrke: on soil, March 2002.
- Amblystegium serpens** (Hedw.) Schimp.
Village Svrke: on bark of decaying tree, March 2002.
- Barbula unguiculata** Hedw.
Village Svrke: on soil, March 2002.
- Brachythecium albicans** (Hedw.) Schimp.
Drage: *Abieti-Fagetum* forest, on soil, October 2001.
- B. rotabulum** (Hedw.) Schimp.
Village Redice: on bark of *Corylus* and on soil, October 2001 and March 2002; Stream Plašnica: on soil, October 2001.
- Brachytheciastrum velutinum** (Hedw.) Ignatov & Huttunen
Drage: *Abieti-Fagetum* forest, on soil, October 2001; village Svrke: on soil, March 2002.
- Bryothyrophyllum recurvirostrum** (Hedw.) P.C. Chen.
Drage: *Abieti-Fagetum* forest, on rocks, October 2001.
- Bryum caespiticium** Hedw.
Stream Plašnica: on rocks, October 2001.
- B. capillare** Hedw.
Drage: *Abieti-Fagetum* forest, on bark of decaying tree, October 2001; village Svrke: on soil, March 2002; village Redice: on soil, March 2002.
- B. pseudotriquetrum** (Hedw.) P. Gaertn. & al.
Stream Plašnica: on rocks, October 2001.
- Campyliadelphus chrysophyllus** (Brid.) R.S. Chopra
Drage: *Abieti-Fagetum* forest, on bark of decaying tree, October 2001; village Redice: on soil, March 2002.
- Ctenidium molluscum** (Hedw.) Mitt.
Drage: *Abieti-Fagetum* forest, on soil, October 2001.
- Dicranodontium denudatum** (Brid.) E. Britton
Jelje: *Abieti-Fagetum* forest, on bark of decaying tree, October 2001.
- Dicranum polysetum** Sw. ex Añon
Popov Krš: on soil and on rocks, October 2001.
- D. scoparium** Hedw.
Popov Krš: *Abieti-Fagetum* forest, on bark of decaying tree, October 2001; Drage: *Abieti-Fagetum* forest, on soil and on rocks, October 2001; village Svrke: on soil, March 2002; Prodo: on rocks, October 2001.
- Didymodon acutus** (Brid.) K. Saito
Village Gornje Lipovo: on soil, October 2001.
- D. vinealis** (Brid.) R.H. Zander
Village Redice: on soil, October 2001.
- Ditrichum flexicaule** (Schwägr.) Hampe
Prodo: on soil and on rocks, October 2001.
- D. pusillum** (Hedw.) Hampe
Popov Krš: on bark of decaying tree, October 2001.
- Encalypta streptocarpa** Hedw.
Popov Krš: on soil, October 2001; Drage: *Abieti-Fagetum* forest, on rocks, October 2001; Prodo: on soil, October 2001; village Redice, on soil, October 2001.
- Fissidens taxifolius** Hedw.
Village Redice: on soil, March 2002.
- Grimmia pulvinata** (Hedw.) Sm.
Village Redice: on rocks, October 2001 and March 2002.
- Hedwigia ciliata** (Hedw.) P. Beauv.
Prodo: on soil, October 2001.
- Herzogiella seligeri** (Brid.) Z. Iwats.
Jelje: *Abieti-Fagetum* forest, on soil and on rocks, October 2001.
- Homalothecium lutescens** (Hedw.) H. Rob.
Drage: *Abieti-Fagetum* forest, on rocks, October 2001; village Svrke: on rocks, March 2002; Prodo: on rocks, October 2001.
- H. sericeum** (Hedw.) Schimp.
Village Gornje Lipovo: on bark of decaying tree, on soil and on rocks, October 2001; Drage: *Abieti-Fagetum* forest, on soil and on rocks, October 2001; village Svrke: on soil and on rocks, March 2002; Prodo and village Redice: on rocks, October 2001.
- Hygroamblystegium varium** (Hedw.) Mönk.
Drage: *Abieti-Fagetum* forest, on soil and rocks: October 2001.
- Hylocomium splendens** (Hedw.) Schimp.
Prodo: on soil, October 2001; village Svrke: on soil, March 2002.
- Hypnum cupressiforme** Hedw.
Village Gornje Lipovo: on bark of *Fagus silvatica*, October 2001; Drage: *Abieti-Fagetum* forest, on soil and on rocks, October 2001; village Svrke: on soil and on rocks in oak forest, March 2002.
- Isoetecium alopecuroides** (Lam. ex Dubois) Isov.
Jelje: *Abieti-Fagetum* forest, on soil and on rocks, October 2001; village Svrke: on soil and on rocks, March 2002.
- Leskea polycarpa** Hedw.
Village Gornje Lipovo: on soil, October 2001.
- Leucodon sciuroides** (Hedw.) Schwägr.
Village Gornje Lipovo: on bark of *Fagus silvatica*, October 2001; Drage: *Abieti-Fagetum* forest, on soil, on the rocks, on bark of decompose tree, October 2001; village Svrke: on rocks and on bark of *Fagus silvatica*, March 2002.
- Mnium hornum** Hedw.
Jelje: on soil, October 2001.
- Neckera complanata** (Hedw.) Huebener
Village Svrke: on rocks in oak forest and on bark of *Fagus silvatica*, March 2002.
- Orthotrichum anomalum** Hedw.
Village Gornje Lipovo: on rocks, October 2001; Drage: *Abieti-Fagetum* forest, on rocks, October 2001; village Redice: on rocks, October 2001.
- Palustriella commutata** (Hedw.) Ochyra
Stream Plašnica: on soil, October 2001.
- Plagiomnium affine** (Blandow ex Funck) T.J. Kop.
Village Svrke: on soil, March 2002.
- P. cuspidatum** (Hedw.) T.J. Kop.
Village Redice: on soil, October 2001.
- Pohlia nutans** (Hedw.) Lindb.
Jelje: on soil, October 2001.
- Polytrichastrum alpinum** (Hedw.) G.L. Sm.
Drage: *Abieti-Fagetum* forest, on soil, October 2001.
- Pseudocrossidium hornschuchianum** (Schultz) R.H. Zander
Prodo: on rocks, October 2001.
- Pseudoleskea incurvata** (Hedw.) Loeske
Village Gornje Lipovo: *Abieti-Fagetum* forest, on soil and on rocks, October 2001; Drage, Jelje: *Abieti-Fagetum* forest, on soil and on rocks, October 2001.
- Pseudoleskeella catenulata** (Brid. ex Schrad.) Kindb.
Drage: *Abieti-Fagetum* forest, on soil and on rocks, October 2001.
- P. nervosa** (Brid.) Nyholm
Village Svrke: on rocks in oak forest, March 2002.
- Pterigynandrum filiforme** Hedw.
Village Gornje Lipovo: on bark of *Fagus silvatica*, October 2001; Drage: *Abieti-Fagetum* forest, on soil, October 2001; village Svrke: on soil, on bark of *Fagus silvatica* and on rocks in oak forest, March 2002.
- Pylaisia polyantha** (Hedw.) Schimp.
Village Svrke: on soil, March 2002.
- Racomitrium canescens** (Hedw.) Brid.
Village Gornje Lipovo: on soil and on rocks, October 2001.

- Rhizomnium punctatum* (Hedw.) T.J. Kop.
Jelje: *Abieti-Fagetum* forest, on soil, October 2001.
- Rhynchostegium murale* (Hedw.) Schimp.
Village Svrke: on rocks in oak forest, March 2002.
- Rhytidiadelphus loreus* (Hedw.) Warnst.
Drage: *Abieti-Fagetum* forest, on soil, October 2001.
- R. triquetrus* (Hedw.) Warnst.
Prodo: on soil, October 2001.
- Rhytidium rugosum* (Hedw.) Kindb.
Village Svrke: on soil, March 2002.
- Sanionia uncinata* (Hedw.) Loeske
Prodo: on soil, October 2001.
- Schistidium apocarpum* (Hedw.) Bruch & Schimp.
Popov Krš: on the rocks, October 2001; Drage: *Abieti-Fagetum* forest, on the bark of decaying tree and on rocks, October 2001; village Svrke: on soil and on rocks in oak forest, March 2002; village Redice: on rocks, March 2002.
- Tortella inclinata* (R. Hedw.) Limpr.
Village Redice: on soil, March 2002; Popov Krš: on soil, October 2001; village Gornje Lipovo: on soil, October 2001; Drage: *Abieti-Fagetum* forest, on soil and on rocks, October 2001; village Redice: on rocks, October 2001.
- T. tortuosa* (Hedw.) Limpr.
Prodo: on soil, October 2001; village Redice: on soil, October 2001; village Gornje Lipovo: on soil, *Abieti-Fagetum* forest, on soil and on rocks, October 2001.
- Syntrichia ruralis* (Hedw.) F. Weber & D. Mohr
Village Gornje Lipovo: on soil, on rocks, and on bark of *Fagus silvatica*, October 2001; Drage, Jelje: *Abieti-Fagetum* forest, on soil, October 2001; Prodo: on soil and on rocks, October 2001; village Redice: on rocks, October 2001.
- Tortula subulata* Hedw.
Village Svrke: on soil, March 2002.

List of liverworts

- Metzgeria furcata* (L.) Dumort.
Drage: *Abieti-Fagetum* forest, on bark of decaying tree, October 2001; village Svrke: on rocks and on bark of *Fagus silvatica*, March 2002.
- Plagiochila asplenioides* (L. emend. Taylor) Dumort.
Drage: *Abieti-Fagetum* forest, on soil: October 2001; Jelje: *Abieti-Fagetum* forest, on soil, October 2001.
- Porella cordaeana* (Huebener) Moore
Drage: *Abieti-Fagetum* forest, on bark of decaying tree, October 2001.
- Preissia quadrata* (Scop.) Nees
Jelje: *Abieti-Fagetum* forest, on soil, October 2001.
- Radula complanata* (L.) Dumort.
Village Gornje Lipovo: on soil, October 2001; Drage: *Abieti-Fagetum* forest, on soil, October 2001; village Redice: on soil and on rocks, March 2002; village Svrke: on soil, March 2002.
- Scapania aspera* Bernet & M. Bernet
Jelje: on soil, October 2001.

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